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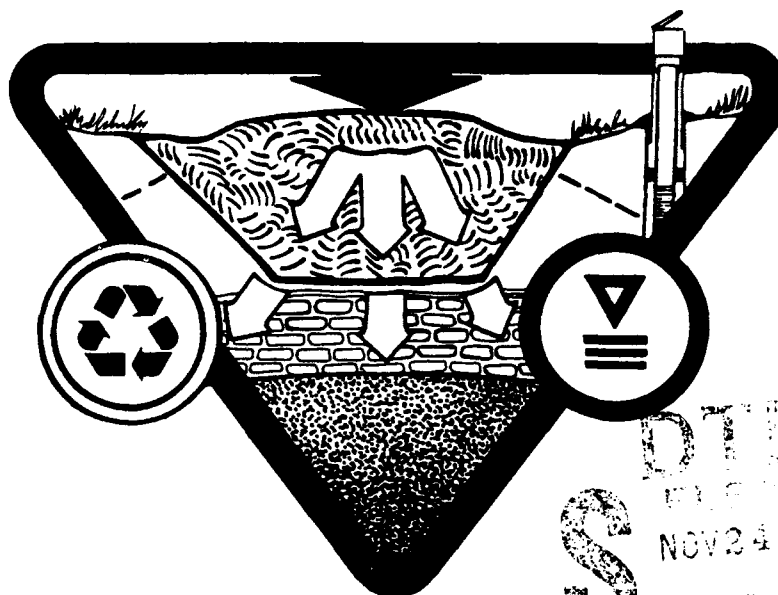
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Developing an Integrated Solid Waste Management Plan

A Guide for Army Installations



U.S. Army Environmental Hygiene Agency
Groundwater and Solid Waste Branch, Waste Disposal Engineering Division
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PREFACE

Regulatory directions and public opinion are placing increased emphasis on solid waste management and recycling issues. Industry, consumers, and government entities are being forced to reevaluate their solid waste management practices and increase the extent of their source reduction and recycling/resource recovery programs. Future legislation is expected to require the development of state solid waste management plans, which would in turn require local government and industry support. The Army contribution toward integrated solid waste management and cooperative recycling begins at the most basic level, with the Integrated Solid Waste Management Plan (ISWMP).

"Integrated" solid waste management reflects the U.S. Environmental Protection Agency's pollution prevention hierarchy, which combines source reduction, recycling, and disposal into the waste management framework. Therefore, the ISWMP includes each of these components. It identifies ways in which source reduction may be used to reduce the waste stream. It defines the various elements of the waste stream and identifies the avenues of recycling or disposal for each. It documents correct procedures for all aspects of solid waste management, including storage, collection, segregation, transportation, treatment, recycling, and disposal. It presents factors potentially affecting solid waste management, and lists alternatives and contingency plans for future consideration. However, the ISWMP is not only a written document; ideally it is a mechanism used to evaluate and improve solid waste management at the installation.

The decisions involved in solid waste management today are diverse and far-reaching. Should we contract disposal or operate an onsite landfill? Will recycling pay or cost us? Which recyclables should be included in the recycling program? Should we build an incinerator or participate in regional disposal efforts? How can source reduction enhance the solid waste management program?

While many installations are faced with such questions, it is beyond the scope of this guide to provide the necessary analysis and decision-making tools. Factors affecting solid waste decisions will vary with location, state legislation, recyclable markets, type of facility, population, and mission, to name a few. This technical guide is meant to provide Army installations with a generic framework for developing a complete and effective ISWMP. Decision-making, policy, and planning factors are provided for information, to be considered where applicable.

Finally, the following objectives should be kept in mind when preparing the ISWMP:

- Comply with applicable Federal, state, and local regulations regarding solid waste management and recycling.
- Strive to achieve waste reduction goals set by the Department of Defense, the Army, and the Federal and state governments.
- Characterize the types and amounts of solid waste (including nonregulated or special wastes, potential recyclables, and construction debris) generated through standardized data collection procedures.
- Describe the storage, collection, transportation, and disposal for each category of solid waste identified.
- Demonstrate that alternate disposal mechanisms have been identified and evaluated prior to the selection of the preferred disposal method. Provide for future evaluations of disposal options based on changes in waste generation, governing regulations, and/or the availability of regional disposal facilities.
- Include a recycling plan which identifies recyclables and describes the storage, collection, and transportation procedures, as well as the ultimate destination of the material (collection center, processing plant, etc.).

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USAEHA TECHNICAL GUIDE NO. 197

DEVELOPING AN INTEGRATED SOLID WASTE MANAGEMENT PLAN

A GUIDE FOR ARMY INSTALLATIONS

I. GENERAL.

A. Basis for Guide. This technical guide was developed to reflect U.S. Environmental Protection Agency (EPA) requirements for state solid waste management plans, with the presumption that Army facilities will face similar requirements. It is also a response to a need to introduce integrated solid waste management to the Army community. The guide reflects a compilation of various states' requirements concerning the contents of solid waste management plans. Although specific state requirements may vary, this guide covers the relevant issues pertaining to solid waste management. It has the flexibility to be tailored to specific installation needs.

B. Guide Format. This guide is structured to mirror the organization and contents of an Integrated Solid Waste Management Plan (ISWMP), beginning with the following section, APPLICABLE REGULATIONS AND REFERENCES. An outline format is presented to facilitate conversion to an actual installation plan. Where necessary, the outline has been supplemented with examples or descriptions to clarify the topic headings.

II. APPLICABLE REGULATIONS AND REFERENCES. The following state, Federal, and Army references apply to solid waste management and recycling at Army installations. These laws, regulations, and guidelines should be used in the development of the ISWMP and referenced within the document. Though Federal legislation has established national solid waste policy, states have the lead for policy implementation, the right to issue more restrictive regulations, and the power of enforcement. State and local requirements are often the most stringent and dominating factors driving an installation's solid waste management program. The generic state regulations are therefore prioritized below, and local rules should be added when applicable.

A. State Solid Waste Management Act (Title, Chapter, date of enactment).

B. State Solid Waste Management Regulations (Governing Agency, Regulation title, latest date of amendment).

C. Public Law 94-580, 21 October 1976, Resource Conservation and Recovery Act of 1976, Subtitle D.

D. Public Law 152, The Federal Property and Administrative Services Act of 1949, as amended.

E. Title 40, Code of Federal Regulations (CFR), 1991 rev, Part 243, Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste.

F. Title 40 CFR, 1991 rev, Part 256, Guidelines for Development and Implementation of State Solid Waste Management Plans, September 1981.

G. Title 40 CFR, 1991 rev, Part 257 - Criteria for Classification of Solid Waste Disposal Facilities and Practices.

H. Title 40 CFR, 1991 rev, Part 258, Criteria for Municipal Solid Waste Landfills.

I. Decision-Makers Guide to Solid Waste Management, EPA/530-SW-89-072, November 1989.

J. Department of Defense Instruction 7310.1, Disposition of Proceeds from DoD Sales of Surplus Personal Property.

K. Army Regulation (AR) 200-1, 23 April 1990, Environmental Protection and Enhancement.

L. AR 420-47, Solid and Hazardous Waste Management, 1 January 1985.

M. Installation Recycling Guide, U.S. Army Engineering and Housing Support Center, TN 420-47-02, 1 September 1991.

N. Analysis of U.S. Army Solid Waste Management Policy, Army Environmental Policy Institute, July 1992.

O. Integrated Solid Waste Management, U.S. Army Engineering and Housing Support Center, PWB 420-47-03, 3 May 1993.

P. Memorandum, Office of the Chief of Engineers, (CEHSC-FU-S), 29 March 1993, Subject: Army Policy for Solid Waste Management.

III. PURPOSE STATEMENT. The ISWMP must have an explicit statement of purpose, which should include at least the following elements:

A. To accomplish solid waste management effectively and in a way protective of human health and the environment.

B. To comply with applicable Federal, state, local, and Army solid waste management regulations.

C. To reduce the rate of solid waste generation at the installation to meet national, Department of Defense (DOD), and Army waste reduction goals.

D. To reuse or recycle elements of the solid waste stream to the maximum extent possible.

IV. BACKGROUND INFORMATION. The background information in the ISWMP should be installation-specific and relevant to some aspect of solid waste management. Lengthy descriptions of the installation's environmental setting are not necessary, but the ISWMP may include references to documents containing such data. Past on-post disposal sites, though they may be of concern from a health or environmental standpoint, are not appropriate for inclusion in an ISWMP. The exception is if the closed sites are being considered as alternative options for waste disposal. Contents should be limited to current solid waste practices and programs as well as future considerations.

A. Location. Identify the state, county, and municipality. The distances to nearby cities may be helpful in order to gauge distances to recycling centers or municipal disposal facilities. Descriptions of physiographic location and natural borders to the installation (rivers, mountains, etc.) may also be useful.

B. Current Land Use. Summarize the land use within the installation boundaries, such as percent housing, administration, industrial, disposal/transfer facilities, training, firing ranges/impact areas, and wetlands.

C. Mission. State the current and future mission(s) of the installation.

D. Population.

1. Current. State the population of the military and civilian workforce and number of on-post residents.

2. 10- and 20-Year Projection. State the projected military and civilian workforce, and number of residents, if available.

E. Master Plan. Report any planned major constructions, demolitions, or alterations in land use which could affect solid waste generation.

F. Planning Factors. Briefly identify the major factors affecting solid waste management planning and decision-making at the installation. These should be discussed in greater detail under Section XI, FACTORS AFFECTING SOLID WASTE MANAGEMENT DECISION-MAKING, but may be listed here to provide an overall picture of the installation's solid waste situation and constraints. Such factors may be legal, regulatory, economic, environmental, political, operational, or logistical. Factors to be considered may also relate to the size, mission, location, or closure/realignment status of the installation.

V. RESPONSIBILITIES. A major element of the ISWMP is the identification of responsibilities for all levels of solid waste management, including the installation commander, garrison staff directors, and a Solid Waste Management Board. The following paragraphs contain examples of roles and responsibilities in the overall solid waste management program. Installations may tailor these to fit their particular needs.

A. Installation Commander.

1. Establish an organizational structure to plan, execute, and monitor the solid waste program.
2. Program, budget, and defend resource requirements to manage the solid waste program, including funds for equipment, studies, operational costs, maintenance costs, treatment, storage or disposal, waste minimization, and personnel training.
3. Determine the most cost-effective and efficient means of waste treatment, storage, or disposal, including the use of: a regional facility on non-Army owned property for resource recovery, treatment, or disposal; industrial wastewater treatment plants, where applicable; and waste disposal services other than the Defense Reutilization and Marketing Service (DRMS).
4. Identify a person to be responsible for daily management of solid waste.
5. Formally establish the installation Qualifying Waste Recycling Program (QWRP) and designate a person or activity to be the QWRP manager. Also establish and oversee a materials accounting procedure to track the materials processed/sold and a financial accounting system for the receipts and disbursements of funds.
6. Through Installation Solid Waste Management Board or other established procedure, ensure that the proceeds from the recycling program are used in accordance with Public Law 152 (reference D) and DoD Instruction 7310.1 (reference J).

7. Ensure sufficient funding levels to comply with the Resource Conservation Recovery Act (RCRA) requirements and support pollution prevention initiatives.

8. Ensure that all required training is approved, resourced, accomplished, and documented.

B. Directors. (To include Directors of Engineering and Housing; Directors of Safety, Health, and Environment; or Directors of Installation Support).

1. Serve as the Installation Commander's expert representative for the management of solid wastes (unless otherwise designated by the Commander).

2. Advise all waste generating activities of state, Federal, and Army requirements for managing solid wastes, including requirements for permit and reporting and recordkeeping.

3. Monitor installation compliance with local, state, Federal, and Army solid waste management requirements, including tenant activities and subinstallations, and recommend changes in policies or procedures to improve program management to the Commander when necessary.

4. Advise the Commander, in coordination with waste generating activities, on the most cost-effective and efficient means of waste storage, treatment, and disposal, to include the siting of new waste management facilities and the need to modify existing facilities.

5. Establish, monitor, and execute programs in waste management, including waste minimization, resource recovery, and recycling. This will be done in compliance with State and Federal solid waste laws and regulations and the requirements of Army regulations.

6. Ensure regular and systematic collection of solid wastes from designated pickup stations, and disposal of solid wastes to provide efficient and cost-effective service per the requirements of Army regulations.

7. Periodically review such factors as number and location of pickup stations, truck routes, type of equipment, scheduling, supervision, and use of personnel to effectively manage solid wastes.

8. Identify the solid waste activities which are carried out by contract, review the responsibilities, and monitor the performance of the contractor.

C. Chief, Environmental Management Office/Environmental Coordinator.

1. Periodically review all applicable state, Federal, and Army requirements for managing solid wastes.

2. Serve as the installation point of contact for questions, complaints, or other notification regarding solid waste management or recycling.

3. Maintain liaison and coordinate as necessary with state and Federal solid waste regulators.

4. Monitor installation compliance with local, state, Federal, and Army solid waste management requirements, including tenant activities and subinstallations, and recommend changes in policies or procedures to improve program management to the Commander when necessary.

5. Assist in advising the Commander, in coordination with waste generating activities, on the most cost-effective and efficient means of waste storage, treatment, and disposal, to include the siting of new waste management facilities and the need to modify existing facilities.

D. Director of Logistics/Director of Supply.

1. Advise procuring activities on procedures for integrating waste reduction and recycling program goals into installation procurement programs to achieve federally mandated and Army endorsed goals and objectives.

2. Advise waste-generating activities on proper requirements for packaging, labelling, and shipping of solid waste to ensure compliance with Federal, state, Army, and DOD requirements.

3. Ensure environmentally safe on-post and off-post transportation of solid wastes.

4. Actively support the Directorate of Engineering and Housing (DEH) in measuring progress to meet Federal and Army waste reduction goals and requirements.

5. Communicate regularly with the Defense Logistics Agency (DLA) activity serving the installation to maintain current information on markets for excess or unserviceable materials and recyclable materials.

E. Installation Safety Manager. Monitor the storage, packaging, transportation, treatment, and disposal of solid wastes and oversee personnel training requirements to ensure compliance with Federal, state, and Army safety standards.

F. Solid Waste Management Board. Installations are encouraged to form a Solid Waste Management Board, a forum for planning, identifying needs and objectives, and coordinating between various installation elements. The Solid Waste Management Board may be a subcommittee of the installation Environmental Quality Control Committee (EQCC). Identify individuals or organizations participating in the installation's Solid Waste Management Board. Participation should include the Commander (or representative); Recycling Program Manager; Engineering and Environmental Offices; Defense Reutilization and Marketing Office; Morale, Welfare, and Recreation; Logistics/ Supply; Safety Office; Public Affairs; and Finance and Accounting.

G. QWRP Manager.

1. Formally establish the QWRP as directed by the installation Commander.
2. Develop and implement the Recycling Program, including program organization, promotion, procurement of equipment, securing of contracts, hiring of personnel, establishment of operating procedures, and data collection/ recordkeeping.

H. Personnel Responsible for Solid Waste Handling/Recycling.

1. Follow all guidance and installation SOP's concerning safety, health, and environmental aspects of solid waste management.
2. Complete training required to perform duties.
3. Maintain records of solid waste/recycling activities where applicable.

I. Defense Reutilization and Marketing Office.

1. Serve as the local representative of the Defense Logistics Agency.
2. Perform market research [with assistance from the Defense Reutilization and Marketing Region (DRMR)] concerning resale value and recycling opportunities for wastes generated at the installation.
3. Determine which items are reused, resold, or recycled.
4. Advise generating activities on the required turn-in procedures, including packaging, labelling, and transporting of materials to facilitate sales/recycling.
5. Assume accountability for materials properly turned in for disposal, resale, or recycling.

6. Periodically conduct sales.

7. Maintain records concerning types and quantities of materials turned in, and proceeds for various resale/recycling activities.

J. Contractors. (Indicate the solid waste activities which are carried out by contract, and state the responsibilities).

VI. INSTALLATION SOLID WASTE GENERATION.

A. Waste Characterization. The basis for all solid waste management decision-making is a characterization of the wastes generated. This may be accomplished through in-house recordkeeping, a contractor survey, or by Army support agencies. The steps involve tracking wastes from the generator level to turn-in/waste pickup to final destination. Resources used to gather this data include generator interviews, solid waste removal/disposal contracts, waste hauler records, disposal facility records, turn-in documents, records from the environmental office and the Defense Reutilization Marketing Office (DRMO), and interviews with key personnel.

B. Waste Categories. The following are categories of solid wastes which should be included in the ISWMP.

1. **Residential Waste.** Indicate the number of households or buildings serviced. This waste may be the most easily characterized and measured, and usually consists of paper, glass, metal, plastics, food wastes, bulky items, furniture, and yard waste. In most cases, this type of waste is removed by a solid waste contractor and disposed of in an off-post landfill. It typically includes wastes from single and multi-family dwellings, BOQ's, and troop housing.

2. **Commercial Waste.** In some cases, this type of waste is removed by a solid waste contractor and disposed of in an off-post landfill. Waste hauler records or landfill logs should provide estimates, although these may not be accurate. The best way to characterize and measure these wastes is to perform a generator survey. These include administrative offices, commissaries, food service operations, medical facilities (not including regulated medical wastes), warehouses, and post exchanges. Typical wastes include paper, food wastes, cardboard, clothing and textiles, furniture, and packing materials.

3. **Industrial (Nonhazardous) Waste.** List the types and quantities, locations generated, and special handling/disposal requirements. These may include materials discarded from industrial operations and manufacturing processes, such as scrap metals, nonhazardous solvents, greases and oils.

4. **Construction/Demolition Waste.** Estimate types and quantities, and locations where wastes have been placed on the installation in the past. Based on projected demolition (available from Installation Master Planner), forecast future demolition waste disposal needs. Typical wastes include lumber, timber, reinforcing steel, piping and wiring, concrete, brick, plaster, wall board, roofing, insulation materials, and asphalt.

5. **Special Wastes.** Indicate types and quantities of nonhazardous special wastes generated, including waste oil, vehicle tires, ash, regulated medical wastes, water treatment/wastewater treatment sludges, dead animals, yard wastes, pallets, soil, batteries, asbestos, kitchen grease, explosives-contaminated materials, pesticide containers, pollution control residuals, mining wastes, agricultural wastes, and septic tank wastes.

C. **Quantifying Wastes.** The ISWMP should estimate quantities of wastes in units of weight (pounds or tons) rather than volume (cubic yards), since it is an Army goal to collect standardized data in this form. There are several methods of measuring and recording the amounts of solid waste generated.

1. Since wastes are typically weighed at disposal sites, a given load may reflect wastes from outside sources in addition to an installation's wastes. Therefore, waste hauler records may not accurately reflect an installation's generation rate. For this reason, installations are encouraged to procure or lease truck scales for measuring the bulk of solid waste leaving the installation.

2. Systematic waste surveys over a period of time is also a good way to characterize and measure a particular waste stream. Factors that must be considered in the study are seasonal and climatic variations, large influx or exodus of families and soldiers, state and local solid waste regulations, and recycling efforts.

3. Many installations measure solid wastes by converting container volumes to weights. There are several problems with this practice: it may be difficult to estimate container fullness accurately, different waste types have different volume/weight ratios, and accuracy is lost in the conversion process.

4. Another way to estimate quantities of specific wastes is to compare to typical municipal waste stream breakdowns. This method only applies to residential/household wastes, and does not accurately address the unique wastes generated on Army installations.

5. The Integrated Facilities System-Mini/Micro (IFS-M) may be a good method for recording all the necessary solid waste generation, recycling, and disposal statistics on the installation, as well as the associated finance and accounting data. The Army has fielded the IFS-M as the automated system for DEH work management. User

requests for changes (System Change Proposal Process) to the IFS-M system would be required to make this possible. The IFS-M will also make simpler the transition to a mandatory, common weight-based measurement system for recording and reporting all Army solid waste transactions.

VII. SOLID WASTE STORAGE AND COLLECTION.

A. Storage.

1. List the types, sizes, and locations of solid waste/recycling containers on the installation.
2. Detail the procedures for closing, cleaning, and maintaining the containers, or devise an inspection program if the responsibility lies with a contractor.
3. Describe a mechanism for evaluating whether containers are the right size and whether wastes are collected at appropriate frequencies. Examples are routine inspections of containers just prior to waste pickups, or requiring the waste hauler to record any problems with waste storage.
4. List any specific storage requirements, such as bagging of food wastes, segregation or preparation of recyclables.
5. Evaluate costs of Army-owned containers versus contractor-owned. Include replacement/repair costs (Army-owned) and contract cost changes for adding/subtracting containers (contractor-owned).

B. Collection.

1. Contracted Collection.
 - a. Attach a copy of the scope of work for solid waste collection services. Incorporate state requirements into the scope of work. Address any recycling programs which impact collection services.
 - b. Include the collection schedules for solid waste pickups for each storage location.
 - c. Include an inspection program for collection vehicles to confirm they are closed and refuse does not leak or blow during transport.

d. Include a copy of the disposal agreement between the transporter and the disposal site operator (if wastes are taken off post). Include an inspection program to conduct random site visits of the disposal site receiving the installation's solid waste.

e. List the recordkeeping procedures associated with solid waste collection. Haulers should be required to measure the wastes collected, either by using a truck scale or estimating the amounts of wastes during each pickup (Forms DA 3916, Daily Log of Truck Trip for Refuse Collection and Disposal and DA 3917, Refuse Collection and Disposal).

2. Installation (In-House) Collection.

a. List the sizes and types of collection vehicles used on the installation. Include maintenance requirements and inspection schedules to guarantee vehicles are in working order and appropriately washed.

b. List the training/safety requirements for collection vehicle and/or landfill equipment operators.

c. Include the collection schedules for solid waste pickups for each storage location, including curbside and/or drop-off points for recycled materials.

d. Evaluate costs of contractor collection versus Army collection in order to justify using installation resources.

VIII. SOURCE REDUCTION PROGRAMS.

A. A critical and primary element in solid waste management involves the reduction of waste volume and toxicity. Benefits are derived in the form of natural resource conservation, reduction in treatment/disposal costs, and removal of risks and liabilities associated with disposal. Source reduction differs from recycling in that it focuses on reducing the waste stream at the source, to include procurement policies and the way products are used (and reused). Source reduction, according to the EPA definition, also includes the reuse of materials with little or no "processing" involved.

B. Describe ongoing procedures for minimizing wastes through affirmative procurement programs, innovative buying policies, material reuse, donation, and process alterations. An affirmative procurement program assures that products made from recovered materials are purchased by the installation, and is required by RCRA Section 6002 and Executive Order (EO) (TBD). The EPA has issued procurement guidelines for paper, paper products, lubricating oils, retreaded tires, building insulation materials and certain materials containing fly ash. Installation acquisition

activities should comply with the latest Federal, DOD, and Army acquisition regulations in developing and carrying their procurement programs to support the installation mission.

C. Examples of source reduction program elements are:

1. Evaluate procurement procedures to obtain materials with less packaging (for example, buying in bulk, in concentrated form, or in lightweight containers).
2. Evaluate procurement practices to include the potential for buying items made from recycled materials and/or which are themselves recyclable.
3. Evaluate procurement procedures to eliminate stockpiling of materials and only order what will be used.
4. Investigate buying products which have reusable components rather than disposable (refillable containers, for example).
5. Evaluate industrial and administrative processes and modify to reduce the amount or toxicity of waste generated.
6. Create a waste exchange within the installation where activities can transfer usable items to other activities.
7. Develop programs to educate installation consumers about buying "environmentally friendly" products.

IX. RESOURCE RECOVERY PROGRAMS. Recycling and composting are two of the most effective ways to recover valuable resources from the solid waste stream. These programs entail removing materials from the waste stream and processing them into usable forms.

A. **Recycling.** According to AR 200-1 (23 April 1990), "Installations will establish or expand recycling programs....Solid waste will be recovered and recycled to the greatest extent practicable." Federal facilities are also tasked with taking the lead in recycling by EO 12780. However, although the incentives exist, the form recycling programs take is not mandated. The following may provide some direction as to the development and documentation of recycling programs. (More information may also be found under Section X, EXISTING SOLID WASTE MANAGEMENT FACILITIES, paragraph F, Recycling Facilities).

1. Program Organization.

a. Indicate whether the program is a "Qualifying Waste Recycling Program."

b. Indicate the proponent organization and general type of recycling program (curbside, mixed or segregated collection, labelled dumpsters, drop-off centers, etc.).

2. Policies and Procedures. List the installation policies and procedures established for the recycling program. They may be incorporated into an installation regulation or SOP's.

3. Responsibilities. Refer to Section V for examples of responsibilities relevant to these positions.

a. Installation Commander.

b. QWRP Manager.

c. Chief, Environmental Management Office or Environmental Coordinator.

d. Chief, Morale, Welfare, and Recreation.

e. Defense Reutilization and Marketing Office.

f. Installation Safety Manager.

g. Contractors.

h. Personnel handling recyclables.

4. List of Recyclable Materials. Identify materials, sources, amounts generated, special handling, and points of contact. Indicate which recyclables may be added in the future, based on emerging or developing markets.

5. Publicity and Promotion. Identify the mechanisms for promoting the recycling program to installation elements, tenant organizations, and on-post residents.

6. Relationship with Local Recycling Programs. AR 200-1 states that "Army installations and activities that do not have their own established recycling program will cooperate to the extent practicable in recycling programs conducted by the

civilian community." Indicate if recycling programs have been established in the local community, and to what extent the installation is participating or plans to participate.

7. Storage and Collection Requirements. Indicate how recyclable materials are stored and collected. List the turn-in or preparation requirements for all recyclables. Specify container and labelling requirements for all recyclables collected. If recyclables are commingled with other solid wastes, indicate how and where the segregation/processing will occur.

8. Market Research. Identify who is responsible for investigating local and national markets for recycled materials. List any relevant procedures for locating and securing markets.

9. Recordkeeping. Identify the procedures for tracking the recycling program, to include types and amounts of materials collected and revenues generated.

10. Financial Accountability. Ensure that accounting procedures comply with Federal law and DOD/Army regulation.

B. Composting. Composting is the aerobic degradation process which decomposes plant and other organic waste under controlled conditions. Programs may consist of yard wastes only (leaves and grass clippings) or may be a compostable municipal solid waste program, using yard wastes, food wastes, and other degradable organic matter. Composting procedures include collecting wastes, forming into piles, and aerating until an organic-rich material is produced. End uses include mulches and soil conditioners used in landscaping and gardens.

1. Yard Waste.

a. State whether the program is a "backyard" type or centralized. Backyard composting is operated by individual homeowners with little or low technology equipment. Centralized programs are accomplished at a centralized location and operated by installation personnel using mechanical equipment to turn over (aerate) the pile.

b. If composting is a backyard program, estimate the quantity of yard waste diverted from a landfill, describe the education and awareness program.

c. If a centralized program exists, state the quantity of yard wastes collected, the frequency of collection, the size of the compost area, the management procedures used, the equipment used to aerate the piles, the education and awareness program, and end uses for the material. This information may also be provided under Section X, EXISTING SOLID WASTE MANAGEMENT FACILITIES.

2. **Municipal Solid Waste (MSW).** The MSW composting is a developing waste management technology and may not be in use at most installations. A large amount of manual and mechanical pre-processing may be required to segregate the compostable portion from the waste. The compostable portion (yard wastes, food wastes, and paper) can comprise from 30 to 60 percent of the waste stream. Removal of other recyclables may take place at the source, in a curbside collection, or as a pre-screening stage. The MSW composting usually involves the construction of "degesters" or in-vessel systems or enclosed chambers for windrow piles with mechanical turning equipment. The following information may also be listed under Section X, **EXISTING SOLID WASTE MANAGEMENT FACILITIES.**

- a. Describe the facility used: building size, mechanical equipment, storage and processing areas.
- b. State the facility's capacity in cubic yards/tons of input and product.
- c. Provide details on the waste process stream, including any pre-processing for recyclables and non-compostable materials, and the MSW composting digester (in-vessel) systems or chambers for windrow piles.
- d. Describe any quality controls, operating procedures, and end uses for the materials.

X. EXISTING SOLID WASTE MANAGEMENT FACILITIES. Critical to the ISWMP is the identification and evaluation of disposal/recycling alternatives. The options an installation has are often determined by the existing facilities available for their use. These may be regional, local, or on-post facilities. The following list of solid waste management mechanisms may be altered or amended according to the available options for a given installation.

A. Municipal Solid Waste Landfills (Sanitary Landfills).

1. On-post Landfill.

- a. **Existing Disposal Capacity.** Indicate number of pounds/tons received each month, number of cells or trenches, and projected life expectancy. Attach a copy of landfill permit and operational standards.
- b. **10- and 20-year Disposal Capacities/Rates.** Project using both the present disposal rate and future disposal rate (allowing for increased recycling and waste stream reduction).

c. Lateral Expansions. If lateral expansions are planned for the landfill, they must meet the design criteria of new Federal regulations (40 CFR 258, Subpart D - Design Criteria).

d. New Landfills. New landfills must meet all applicable criteria (location, design, operating, etc.) of Federal regulations (40 CFR 258).

e. Map Location. Reference grid coordinates, road intersections, or other identifying information. Include a map showing the location.

f. Landfill Description. Discuss the size in acres, soil and ground-water information, slope and grade of the site.

g. Types/Quantities of Wastes Accepted.

h. Types of Wastes Excluded. Hazardous wastes and bulk liquid wastes (greater than household quantities) must be excluded from the landfill except where permit specifications allow them.

i. Permit Status. Describe type of Landfill Permit, permit number, administering agency, and expiration date.

j. Operating Criteria. As of 9 October 1993, new and existing solid waste landfills must meet the operating criteria specified in 40 CFR 258, Subpart C. Indicate how the installation complies with the following requirements:

(1) **Excluding the Receipt of Hazardous Wastes.** Should include random inspections, recordkeeping, and training of landfill personnel to recognize potential hazardous wastes.

(2) **Cover Material.** The current standard is 6 inches of earthen cover at the end of each working day.

(3) **Disease Vector Control.** Indicate the methods for controlling insects and animals at the landfill.

(4) **Explosive Gases Control.** May include methane monitoring, where applicable.

(5) **Air Release Control.** Open burning at solid waste landfills is severely restricted. Federal regulations [40 CFR 258.24(b)] allow burning of land clearing debris. State restrictions must be followed where applicable.

(6) **Access Control.** Indicate how the installation controls public access to the site (fencing, manned guard house, etc.). Restricted access is required to prevent illegal dumping and other unauthorized activities.

(7) **Run-on/Run-off Control.** A system must be in place to restrict water from entering the active portion of the landfill and control water running off the active portion of the landfill.

(8) **Recordkeeping Requirements.** Requirements specified in 40 CFR 258.29 must be met.

(9) **Utilities.** Indicate whether the site is serviced with water, electric, rest rooms, etc.

(10) **Ground-Water Monitoring and Corrective Action.** A rigorous ground-water monitoring and corrective action program is required by 40 CFR 258, which includes a sampling and analysis program, statistical analysis of results, and a detection/assessment monitoring approach to determine corrective action needs.

(11) **Liquids Restrictions.** Landfill cannot accept liquid waste from tank trucks or in 55-gallon drums.

(12) **Closure/Post Closure.** Includes a final cover, operation of leachate collection system, and ground-water/methane monitoring.

k. **Evaluation of Economic Feasibility.** New Army policy (AR 420-47) requires an analysis be made comparing the life cycle cost of an on-post landfill to that of off-post disposal. If cost of off-post disposal is less than 125% of the Army-owned disposal site, off-post disposal is permitted. Off-post disposal is also permitted when certain advantages exist (with Department of Army approval). See also Section XI, **FACTORS AFFECTING SOLID WASTE MANAGEMENT DECISION-MAKING.**

2. **Municipal/County/Regional Landfills.** For all municipal/county/regional landfills, provide the following information (available from the state or county solid waste agency, or the landfill operators). This information should be provided in the ISWMP regardless of whether the off-post landfills are currently used by the installation. Refer to Section XA1 for further explanations of the following subheadings.

- a. **Existing Disposal Capacity.**
- b. **10- and 20-year Disposal Capacity.**
- c. **Map Location.**

- d. Landfill Description.**
- e. Types/Quantities of Wastes Accepted.**
- f. Types of Wastes Excluded.**
- g. Permit Status.**
- h. Operating Criteria.**
- i. Environmental Controls.**

B. Industrial/Construction Debris Landfills. Although requirements for industrial and construction debris landfills vary with each state, Federal regulations (40 CFR 257) contain general requirements. The following elements should be addressed in the ISWMP. Refer to Section XA1 for further explanations of the following subheadings.

- 1. Existing Disposal Capacity.**
- 2. 10- and 20-year Disposal Capacity.**
- 3. Map Location.**
- 4. Landfill Description.**
- 5. Types/Quantities of Wastes Accepted.**
- 6. Types of Wastes Excluded.**
- 7. Permit Status.**
- 8. Operating Criteria.**
- 9. Environmental Controls.**

C. Incinerators/Waste-To-Energy Plants. This category includes incinerators and waste conversion plants, and falls under the EPA definition of volume reduction processes. Provide the following information (available from the plant or the state/county solid waste agency). Refer to Section XA1 for further explanations of the following subheadings.

- 1. Existing Disposal Capacity.**

2. 10- and 20-year Disposal Capacity.
3. Map Location.
4. Size/Description.
5. Types/Quantities of Wastes Accepted.
6. Types of Wastes Excluded.
7. Permit Status.
8. Operating Criteria.
9. Environmental Controls.

D. Transfer Stations. Transfer stations are centralized facilities for unloading wastes from several small collection vehicles and densely loading into larger vehicles for hauling to distant processing, volume reduction, or disposal facilities. Refer to Section XA1 for further explanations of the following subheadings.

1. Existing Storage Capacity.
2. Projected Storage Capacity.
3. Applicable Permits.
4. Location.
5. Size/Description.
6. Collection and Storage Schedules.
7. Operating Criteria.
8. Environmental Controls (litter, runoff).

E. Recycling Facilities. Recycling facilities include on- and off-post collection centers or reprocessing facilities. They may also include on-post treatment (composting).

1. **Type of Facility.** Indicate whether the facility is on-post or off-post, and if it is used to store and/or process recyclable materials. Indicate if it is a Materials Recovery Facility (MRF).

2. Location/Travel Distance from Installation. Indicate distances involved for transport to collection centers or markets.

3. Materials Accepted/Excluded. For each recycling facility listed, identify the materials that are accepted or excluded. Also note any preparation of recyclables required for each facility.

4. Costs. Estimate costs per recyclable (unit of weight/volume), including collection, transportation, and fees, if applicable.

5. Proceeds. Estimate an expected range based on current and historic market value for each recyclable.

6. Existing Capacity to Store/Process Recyclables. Indicate whether on-post buildings and/or open areas will be used for storage/processing. Indicate whether facilities need to be constructed for this purpose.

7. 10- and 20-Year Projection.

8. Promotion/Public Awareness. Describe the recycling education and awareness program.

XI. FACTORS AFFECTING SOLID WASTE MANAGEMENT DECISION-MAKING.

Many considerations affect the solid waste management alternatives facing installations today. Although this technical guide cannot provide the necessary analysis and decision-making tools, it is our objective to provide relevant factors which may influence solid waste management options. The ISWMP should list the installation-specific factors which will ultimately determine the solid waste management choices made.

A. Limitations Of Current Disposal Capacities. Summarize the potential for on-post/local/regional landfills to close or further restrict the acceptance of installation-generated wastes. Indicate whether other disposal facilities (incinerators, conversion plants) are expected to cease operation or restrict acceptance of installation-generated wastes.

B. Potential For Future Facilities. Include projections for the construction and operation of new waste management facilities (cooperative or regional facilities, for example).

C. Factors To Be Considered. List the factors which are relevant to solid waste management at the installation (examples given below).

1. Installation-Specific.

a. **Mission.** The installation's mission will largely determine the types and quantities of wastes generated, which in turn will determine the recycling rate and the ability to reuse materials. Installations with missions perceived by the public as "hazardous" may find it difficult to find facilities to manage their wastes. Mission changes or base closure/realignment should also be considered in the development of the ISWMP.

b. **Size.** The size of the installation may determine whether there is landfill space and also how much solid waste is generated.

c. **Population.** The larger the on-post population, the more municipal/household wastes generated, creating larger recyclable quantities.

d. **Success of ISWM.** If successful, installation source reduction and resource recovery programs will reduce solid waste generation:

2. **Regional Considerations.** Regional considerations may include the availability of landfill space, as discussed above. Another important factor is the strength of recyclable markets, which may vary considerably and may determine whether or not an item is recycled. Also to be considered are social and political pressures, which may drive solid waste management decisions.

3. **Environmental Setting.** The environmental setting may determine the availability/suitability of landfill space or other solid waste management facilities. Alternatively, environmental conditions may make some locations more amenable to landfill development because of low water table, low precipitation, and favorable subsurface conditions.

4. **Regulatory Requirements.** State and local laws and regulations play an important role in solid waste management issues. Local recycling mandates may dictate which materials are recycled at the installation. State regulations restricting landfill use may prevent the installation from continuing its on-post landfill operations, or provide incentive for the installation to enter into a cooperative agreement with the surrounding community. Finally, a state regulation of certain wastes as hazardous wastes will govern how these wastes are managed on the installation.

5. **Cost.** A long-term comparative cost analysis should be included in the ISWMP for all feasible waste management options. Some factors to be considered are:

a. **Long-term, on-post landfill costs (life cycle costs),** such as routine operations, maintenance of landfill and vehicles, ground-water and methane monitoring, permit renewals, site expansions, reporting and recordkeeping, closure, potential corrective actions, and future liabilities.

b. Off-post disposal costs, such as tipping fees, collection contracts/transportation and vehicle maintenance, reporting and recordkeeping, and the need for alternative disposal methods for wastes excluded at the disposal site.

6. **Legal Factors.** Issues such as liability and property ownership may also come into play during solid waste management decision-making.

D. **Periodic Reevaluations.** The ISWMP should have provisions for reevaluating disposal options under certain conditions. Examples are regulatory changes, changes in the types or quantities of wastes generated, reductions in the waste stream due to successful minimization/recycling programs, and the availability of regional disposal facilities.

E. **Contingency Planning.** The ISWMP should contain provisions for alternate disposal mechanisms in the event that the present facilities fail to meet disposal needs. It is recommended that prior arrangements/agreements be made with regional or local disposal facilities to confirm that a backup option exists.

XII. TRAINING/PUBLIC AWARENESS. A good training and public awareness program is integral to the success, safety, and uniformity of a solid waste management program. The following categories of training/public awareness should be provided for in the ISWMP.

A. **Training.**

1. **Management/Supervisory.** List required and recommended training for personnel responsible for management of the solid waste program.

2. **Technical.** List required and recommended training for personnel involved in evaluating solid waste disposal alternatives, developing waste management procedures and plans, and interpreting waste regulations.

3. **Operational.** List required and recommended training for personnel performing solid waste handling, collection, segregation, or disposal.

B. **Public Awareness.**

1. **Public Meetings.** Require public meeting attendance by installation personnel on issues regarding recycling, landfill operation, and solid waste management.

2. **General Information.** Give a general information number and an installation point of contact responsible for responding to solid waste questions and problems.

3. Publications. Describe installation and local publications/newspapers which could routinely carry solid waste information.

4. Community Outreach. Describe ongoing programs for providing information to the community, such as providing speakers to organization meetings, developing a grade school program, or creating an informational display that can be routinely placed in highly visible areas.